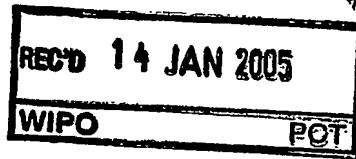




15/2004/0470



INVESTOR IN PEOPLE



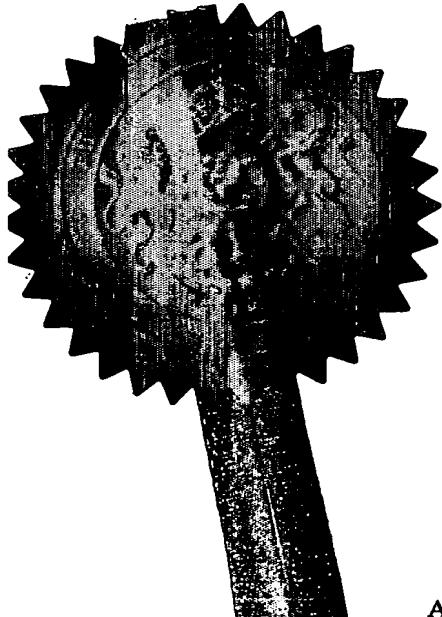
The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.



Signed

Dated 8 December 2004

**PRIORITY
DOCUMENT**
SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH RULE 17.1(a) OR (b)

AVAILABLE COPY

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form

4

Description

Claim(s)

Abstract

Drawing(s)

1 + 1 8

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and search (*Patents Form 9/77*)

Request for substantive examination
(*Patents Form 10/77*)

Any other documents
(please specify)

I/We request the grant of a patent on the basis of this application.



Signature

Date

ANTHONY BURROWS - AGENT

21 OCTOBER 2003

12. Name and daytime telephone number of person to contact in the United Kingdom

ANTHONY BURROWS
01462-481755

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

- a) If you need help to fill in this form or you have any questions, please contact the Patent Office on 08459 500505.
- b) Write your answers in capital letters using black ink or you may type them.
- c) If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.
- d) If you have answered 'Yes' Patents Form 7/77 will need to be filed.
- e) Once you have filled in the form you must remember to sign and date it.
- f) For details of the fee and ways to pay please contact the Patent Office.

A VALVE DEVICE FOR CONTROLLING FLUID FLOW

According to the present invention, there is provided a valve device for controlling fluid flow, comprising a hollow body defining a flow path through said valve device, a valve obturating member in said flow path and movable between a more obturating position and a less obturating position for permitting lesser and greater flows of fluid along said path, said valve obturating member including magnetic portions, and a magnet which is fixed relative to said body and which serves to act upon said valve obturating member to urge said valve obturating member in the sense from said less obturating position to said more obturating position.

Owing to the invention, the valve device can be of very simple construction, with no moving parts other than the valve obturating member itself. Furthermore, if the magnet is an electromagnet, the force urging the valve obturating member towards its more obturating position can be varied in accordance with a change of use, for example use to control the flow of a different fluid, or even while the valve obturating member is moving.

The more obturating position may be an end position in which the valve obturating member is fully closed on a valve seat, so as to be applied to the seat in a substantially fluid-tight manner.

In order that the invention may be clearly and completely disclosed, reference will now be made, by way of example, to the accompanying drawing, which shows a fragmentary, vertical, axial section through a filler valve

device of a filling station of a packaging machine.

Referring to the drawing, part-way down a filler tube 2 in a form-fill-seal packaging machine is an electromagnetic valve 4. The tube 2 does not need to extend vertically downwards but can be in any desired orientation. The valve 4 controls the flow down the tube 2 of a fluid, in particular a liquid, for example milk or orange juice. At the lower end of the tube 2 is a flexible filler nozzle (not shown). The valve device includes a downwardly-facing, annular, valve seat 6 provided by an annular shoulder 8 formed on the inside of the tube 2. Coaxial with and vertically displaceable in the tube 2 is a valve obturating member 10 of the valve 4, the member 10 including a vertical stem 12 at the lower end of which is formed a valve closure head 14 which, in the illustrated, closed position of the member 10, bears sealingly against the valve seat 6 in a substantially fluid-tight manner. The member 10 includes, at its upper end, a radial spider 16 fixed to the stem 12. At the outer periphery of the spider 16 it includes a guiding ring 18 which guides movement of the member 10 along the tube 2 and which, in the closed position shown, is roughly co-extensive with an annular air gap 20 of an electromagnet 22 which fixedly encircles the tube 2 and which consists of an annular core wound with a coil (both of these items being indicated at 24) electrically supplied via leads 26. The core and coil 24 are enclosed within a pair of annular channels 28 and 30 which overlap at their outer edges and are spaced apart at their inner edges to provide the air gap 20. The tube 2 and the

channels 28 and 30 are preferably of non-magnetic material whilst, of the member 10, at least the ring 18 is of magnetic material.

In use of the valve device shown, an electrical current 5 is continuously supplied via the leads 26, so that the electromagnetic field generated by the core and coil 24 attracts the ring 18 so as to urge it to bridge the air gap 20 in a centralised manner. However, the valve 4 is so 10 designed that the bearing of the head 14 on the seat 6 prevents the ring 18 from centering perfectly relative to the air gap 20, thus providing the closing force on the member 10. The member 10 remains closed for as long as the 15 electromagnetic field is maintained at an appropriate strength, or until the member 10 is exposed to a downward force greater than the upward closing force produced by the electromagnetic field. Such downward, opening force will usually be produced by flow of product to be filled into containers and this product flow is generated by a filler pump. When product flow ceases, the member 10 will return to 20 its closed position under the upward force produced thereon by the electromagnetic field.

The valve device described with reference to the drawing has a number of advantages. One advantage is that there are no moving parts other than the valve obturating member 10 25 itself and thus there is less wear and tear than if the closing force were to be produced by a mechanical spring. Moreover, the closing force is easily adjustable by adjustment of the magnitude of the current supplied via the

VALVE/ D27

leads 26. Such easy adjustment of the magnitude of the current through the coil can be very beneficial in applications where it is desired to reduce stress (particularly shear) on stress-sensitive products.

5 Furthermore, the magnitude of the closing force is dependent upon the electromagnetic field and the distance between the air gap 20 and the guiding ring 18, i.e. the greater that distance the lower the closing force. This feature is particularly useful in applications where an inverse
10 progressive force (which is the opposite of what is obtained with a mechanical spring) is required or at least beneficial.

The invention has the advantages of enabling the valve device to be particularly hygienic (since no access is required through the wall of the tube 2), to be relatively
15 inexpensive, and to be flexible in application, and of being usable for a wide field of applications (for example, the invention is readily applicable to the valve device disclosed in EP-A-90664).

111

